Syllabus – Physics 364, Fall 2010
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(revised 2010-09-08)

The overall goal is to be a fun and useful course, after which I intend that you will
- understand what electronics is good for
- know how to use common components & instruments
- know enough to be confident learning more from a textbook (e.g. Horowitz & Hill)
- know how to build solutions to lab/project problems you may encounter later in your career
- have enjoyed time spent in lab – fun change of pace.

Approximate list of topics to be covered – to be refined as semester proceeds
- Week 1: Ohm's law, Kirchoff's laws, voltage dividers, equivalent circuits, input & output resistances, using lab equipment, using LTspice, diodes as nonlinear circuit elements
- Week 2: impedance (complex), filters, frequency domain; transformer, diode rectification, unregulated DC power supply; simple AM radio receiver
- Weeks 3,4: op amps, feedback, opamp circuits (non-inverting amp, inverting amp, integrator, summing amp, …), opamp limitations, comparator, Schmitt trigger
- Weeks 5,6: bipolar junction transistors, BJT circuits (emitter follower, common emitter amplifier, push-pull, differential amp), field-effect transistors, FET circuits (current source, analog switch, sample & hold), home-made 3-stage opamp
- Week 7: binary numbers, digital representation, sampling (Nyquist, Shannon), LabView
- Week 8: digital logic, CMOS gates, logic families, combinational logic
- Week 9: flip-flops, counters, shift registers, other basic sequential logic
- Week 10: programmable logic (e.g. FPGA, CPLD), memories, finite state machines, microprocessor concept
- Week 11: ADCs, DACs, connecting the analog & digital worlds
- Final projects
- Additional topics, depending on time/interest:
  - noise, interference, grounding/shielding
  - PLLs, frequency modulation
  - synthesizer, mixer, heterodyne receiver
  - microcontrollers
  - data buses, parallel & serial interconnects

Grading
> 35% : lab write-ups (do ~ 90% of this in lab)
> 35% : weekly homework problems, LTspice simulations, etc.
> 15% : reading incentives (short/easy quizzes in lecture, online questions before lecture)
> 15% : final project (a long-ish lab or simulation exercise of your own choosing)
> no midterm/final exams

Textbook
> I will provide loaner copies of D.V. Bugg, first edition (1991)

Late assignments

> It is important for you to keep up with the course, so that you can make good use of lab time.
>
> Unless prior arrangement is made, your score will be reduced by a factor 0.9 for every weekday that it is late. So the maximum possible score is 90%, 81%, 73%, 66%, etc., if your work is 1 day, 2 days, 3 days, 4 days late, etc.
>
> If you have a good excuse, you must discuss with Bill or Jose *before* the due date.

Teamwork

> I encourage you to work together, as it is a very effective way to learn. If you work together on a lab or a homework assignment, your write-up should indicate with whom you worked. In any case, everyone must turn in his or her own write-up, and what you write down must be your own reasoning – not the result of dividing the work and copying.